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ERFORMANCE CHARACTERISTICS OF AUTOMOTIVE ENGINES IN THE UNITED STATES

Second Series - Report No. 4

1976 Chevrolet 85 CID (1.4 Liters), IV

D. E. Koehler
T. W. Chamberlain
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W. F. Marshall

U.S. DEPARTMENT OF ENERGY
BARTLESVILLE ENERGY RESEARCH CENTER
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INTERIM REPORT

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16. Abstract

Experimental data were obtained in dynamometer tests of a 1976 Chevrolet 85 CID engine to determine fuel consumption and emissions (hydrocarbon, carbon monoxide, oxides of nitrogen) at steady-state engine-operating modes. The objective of the program is to obtain engine performance data for estimating emissions and fuel economy for varied engine service and duty. The intent of the work is to provide basic engine characteristic data required as input for engineering calculations involving ground transportation.

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PREFACE

This report, prepared by the U.S. Department of Energy, Bartlesville Energy Research Center, for the U.S. Department of Transportation, Transportation Systems Center, Energy Technology Branch, Cambridge MA, presents results of experimental work to obtain information on performance characteristics of an engine used in automobiles sold in the U.S. The engine used in this work is one of a series of 10 engines to be tested in the current program. This is the fourth of the reports to be published covering work with those engines.

This project is funded by the National Highway Traffic Safety Administration, Office of Research and Development, Office of Passenger Vehicle Research, Technology Assessment Division.

Ralph G. Colello and James A. Kidd, Jr., of the U.S. Department of Transportation, Transportation Systems Center, are the technical monitors.

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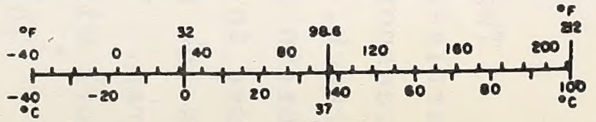
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



1. INTRODUCTION

The data acquired from tests of a 1976 Chevrolet 85 CID engine are presented in this report. This engine is used by Chevrolet in the Chevette models (2,250 lb weight class). The test results are sufficient to establish steady-state maps for fuel consumption and emissions (carbon monoxide, unburned hydrocarbon, and oxides of nitrogen) over the entire operating range of the engine.

The objective of this program is to obtain engine performance data for estimating emissions and fuel economy for varied engine service and duty. The intent of this work is to provide basic engine characteristic data required as input for engineering calculations involving ground transportation.

2. ENGINE TEST REPORT

The engine test setup included a complete engine with the exception of a fan and a cooling tower which was used in place of the radiator. The alternator was included but was not wired into the engine's electrical system. The new mean-tolerance engine was equipped with emission control systems including exhaust-gas recirculation (EGR) and an oxidation catalyst. General engine specifications are listed in table 1. A single batch of unleaded regular-grade gasoline was used throughout the break in (table 2) and test; a detailed fuel analysis if given in table 3. The engine break in consisted of 40 hours of engine operation on the dynamometer. The engine was operated at various speeds and loads designed to simulate road/load conditions. Engine testing began on 10 October 1976 and ended on 23 November 1976. The engine was tested while operating at the steady-state modes shown in table 4.

The following data were recorded for each test point:

Test number
Date
Barometric pressure, mm Hg
Dewpoint, °F
Inlet air temperature, °F
Speed, rpm
Torque, lb-ft -- BLH strain gage load cell; Daytronics indicator
Fuel rate, lb/hr -- Fluidyne positive displacement fuel flowmeter
Ignition timing, °BTC
Manifold vacuum, in. Hg
Throttle angle, deg
CO, pct -- Beckman NDIR
CO_2, pct -- Beckman NDIR
O_2, pct -- Beckman polarographic detector
HC, ppmC -- Custom-built heated flame ionization detector
NO_x, ppm -- Thermo-Electron chemiluminescent detector
Oil temperature, °F
Oil pressure, psig
Coolant temperature, °F
Exhaust temperature, °F
Exhaust pressure, in. H_2O
Intake manifold temperature, °F.

The following equations were used in calculating power, air/fuel ratio, absolute humidity, and mass emission rates of carbon monoxide (CO), unburned hydrocarbons (HC), and oxides of nitrogen (NO_x):

1. Partial pressure of water vapor in intake air (millimeters of mercury):

$$P = \exp\left[18.717 - \frac{7308.1}{393 + D}\right] ,$$

where D = dewpoint, °F.

2. Absolute humidity (grains moisture per pound dry air):

$$H = \frac{4347.8(P)}{B - P} ,$$

where B = barometric pressure, mm Hg.

3. Humidity correction factor (dimensionless):

$$K_H = \frac{1}{1 - 0.0047(H - 75)}$$

Note: This factor is used to correct the NO_x mass emission rate to a standard humidity of 75 grains moisture per pound dry air.

4. Stoichiometric air/fuel ratio (dimensionless):

$$AF_s = \frac{69(2 + \frac{x}{2} - y)}{MW_{fuel}} ,$$

where x = hydrogen-carbon atomic ratio of fuel ,
y = oxygen-carbon atomic ratio of fuel ,
MW_{fuel} = fuel molecular weight per carbon atom,
$= 12.01115 + 1.00797x + 15.9994y$.

5. Hydrogen concentration in raw exhaust (percent):

$$H_2 = \frac{x(CO)(CO + CO_2)}{2(CO + 3CO_2)} ,$$

where CO = carbon-monoxide concentration (percent),
CO_2 = carbon-dioxide concentration (percent).

Note: This equation assumes a water-gas shift equilibrium constant

$$\frac{(CO)(H_2O)}{(CO_2)(H_2)} = 3.$$

6. Correction factor for emission concentrations from wet basis to dry basis (dimensionless):

$$C_W = 1 + \frac{(\frac{x}{2})(CO + CO_2) - H_2}{100}.$$

Note: In these tests only HC is measured on a wet basis. All other species are measured on a dry basis.

7. Air/Fuel ratio (dimensionless):

$$AF = \frac{AF_S}{2 + \frac{x}{2} - y}\left[\frac{(1+\frac{x}{2} - y)(CO) + (2 + \frac{x}{2} - y)(CO_2) + 2(O_2) + \frac{NO_x}{10^4} - H_2}{CO + CO_2 + C_W\,(\frac{HC}{10^4})}\right],$$

where O_2 = oxygen concentration (percent)
NO_x = oxides of nitrogen (ppm)
HC = unburned hydrocarbon concentration (ppmC).

8. Exhaust flow (pounds per hour):

$$M_{EX} = M_F(1 + AF),$$

where M_F = fuel flow rate (pounds per hour).

9. Carbon monoxide mass emission rate (grams per hour):

$$M_{CO} = \frac{M_{EX}}{C_W}(\frac{CO}{100})(\frac{MW_{CO}}{MW_{EX}})453.59237,$$

where MW_{CO} = molecular weight of CO (=28.01115),
MW_{EX} = molecular weight of exhaust gas (=28.967).

10. Unburned hydrocarbon mass emission rate (grams per hour):

$$M_{HC} = M_{EX}(\frac{HC}{10^6})(\frac{MW_{HC}}{MW_{EX}})\ 453.59237,$$

where MW_{HC} = molecular weight per carbon atom of HC,
= $12.01115 + 1.00797x + 15.9994y$.

11. Oxides of nitrogen mass emission rate (grams per hour):

$$M_{NO_x} = \frac{M_{EX}}{C_W}\left(\frac{NO_x}{10^6}\right)\left(\frac{MW_{NO_x}}{MW_{EX}}\right)(K_H)453.59237,$$

where MW_{NO_x} = molecular weight of NO_2 (=46.0028).

12. Power (brake horsepower corrected to a standard barometric pressure of 736.6 mm Hg and a standard temperature of 85° F):

$$HP = \frac{N(T)}{5252.113}\left(\frac{736.6}{B - P}\right)\sqrt{\frac{t + 460}{545}},$$

where N = engine speed (revolutions per minute),
T = brake torque (foot-pounds),
t = air temperature (°F).

3. DISCUSSION OF TEST RESULTS

Maximum corrected brake horsepower, maximum corrected torque and brake specific fuel consumption (bsfc) are shown plotted as a function of engine speed at wide-open throttle (WOT) in figure 1. The maximum brake horsepower exceeds the value quoted in table 1. The engine produced a maximum torque similar to that value quoted in table 1. Maximum torque output and minimum bsfc were found at the same engine speed. The carburetion of the engine was such that lean A/F conditions were maintained throughout the entire engine-operating range except near WOT (figure 2) and at high speeds (4,500 and 5,300 rpm) combined with light loads (power less than 20 bhp). Emission rates of CO and HC were maintained at low levels for all speed and load conditions which were associated with lean A/F (figures 3 and 4). Emission rates of NO_x tended to increase with increasing power output above 1,000 rpm until A/F enrichment occurred for that particular engine speed (figure 5). Fuel rates were generally found to be repeatable for those tests which were duplicated (figure 6). Fuel rate was found to be nearly a linear function of power for engine speeds less than 4,500 rpm and loads less than 75 pct of full load.

4. CONCLUSIONS

The purpose of the experimental work that is reported here is to establish data for this engine. Those data are presented in the accompanying tables of this report.

TABLE 1. MANUFACTURER'S ENGINE SPECIFICATIONS

Displacement, cu in	85
Maximum horsepower, bhp @ 5,200 rpm	52
Maximum torque, lb-ft @ 3,600 rpm	70
Bore and stroke, in	3.228 x 2.606
Configuration	in-line 4-cylinder
Compression ratio	8.5:1
Firing order	1-3-4-2
Ignition timing at idle speed, °BTDC @ 800 rpm	10
Block material	cast iron
Head material	cast iron
Number of crankshaft main bearings	5
Number of compression rings/piston	2
Number of oil rings/piston	1
Cam drive type	sprocket and belt
Valve lift:	
Intake, in	0.371
Exhaust, in	0.371
Valve timing:	
Intake opens, °BTC	20
Intake closes, °ABC	84
Exhaust opens, °BBC	84
Exhaust closes, °ATC	20
Spark plug gap, in	0.035
Engine weight, lb	200
Exhaust-gas-recirculation system:	
Valve type	modulated
Control signal	ported vacuum
Point of discharge	intake manifold
Crankcase emission control:	
Control method	positive crankcase ventilation
Point of discharge	intake manifold
Carburetor type	1V downdraft
Distributor specifications:*	
Centrifugal advance, begins, ° @ 600 rpm	0
Centrifugal advance, intermediate, ° @ 1,000 rpm	4
Centrifugal advance, full, ° @ 2,400 rpm	10
Vacuum advance, begins, ° @ 4 in. Hg	0
Vacuum advance, maximum, ° @ 8 in. Hg	7
Carburetor number	17056030
EGR valve number	7046282
Distributor number	1110654

---

*Distributor rpm and deg.

TABLE 2. ENGINE BREAK-IN SCHEDULE

Simulated Vehicle Speed, mph	Engine Speed, rpm	Manifold Vacuum, in. Hg	Fraction of Time in Mode
0	Idle	19.0	1/11
20	1,100	15.0	"
30	1,700	14.5	"
40	2,300	13.8	"
50	2,800	13.0	"
60	3,300	12.0	"
0	Idle	19.0	"
25	1,400	14.8	"
35	2,000	14.1	"
45	2,550	13.4	"
55	3,050	12.5	"

Mileage per cycle = 90.
Total mileage accumulated over 40-hour break-in period = 1,310.

TABLE 3. FUEL SPECIFICATIONS

Fuel No.	7619
Research octane No.	91.5
Motor octane No.	83.5
Specific gravity, deg	0.7161
API gravity, deg	66.1
Distillation, °F:	
10 pct evaporated	128
50 pct "	218
95 pct "	404
100 pct "	417
Reid vapor pressure, psig	9.5
FIA analysis, pct:	
Aromatics	6
Olefins	17
Paraffins	77
Sulfur, pct	0.024
Lead, g/gal	Trace
Hydrogen/carbon atomic ratio	2.040
Oxygen/carbon atomic ratio	0.000

TABLE 4. TEST-NUMBER CROSS-REFERENCE INDEX

Pct Full Load	Engine Speed, rpm												
	700	800	1,000	1,500	2,000	2,500	3,000	3,400	3,600	4,500	5,200	5,300	5,500
0		1 71	14	22	30	38	46	54	116	62		70 133	
10		2 72	13 80	21 84	29 88	37 92	45 96	53 100	115	61 104	156	69 132	
25		3 73	12	20 129	28	36	44	52	114	60	155	68	
40			11 79	19 83	27 87	35 91	43 95	51 99	113	59 103	154	67 107	
60	4 74		10	18 127	26	34	42	50	112	58	153	66	
75	5 75		9 78	17 82	25 86	33 90	41 94	49 98	111	57 102	152	65 106	
90			8	16	24	32	40	48	110	56	151	64	
100	6 76		7 77	15 81	23 85	31 89	39 93	47 97	109 123	55 101	150	63 105	126

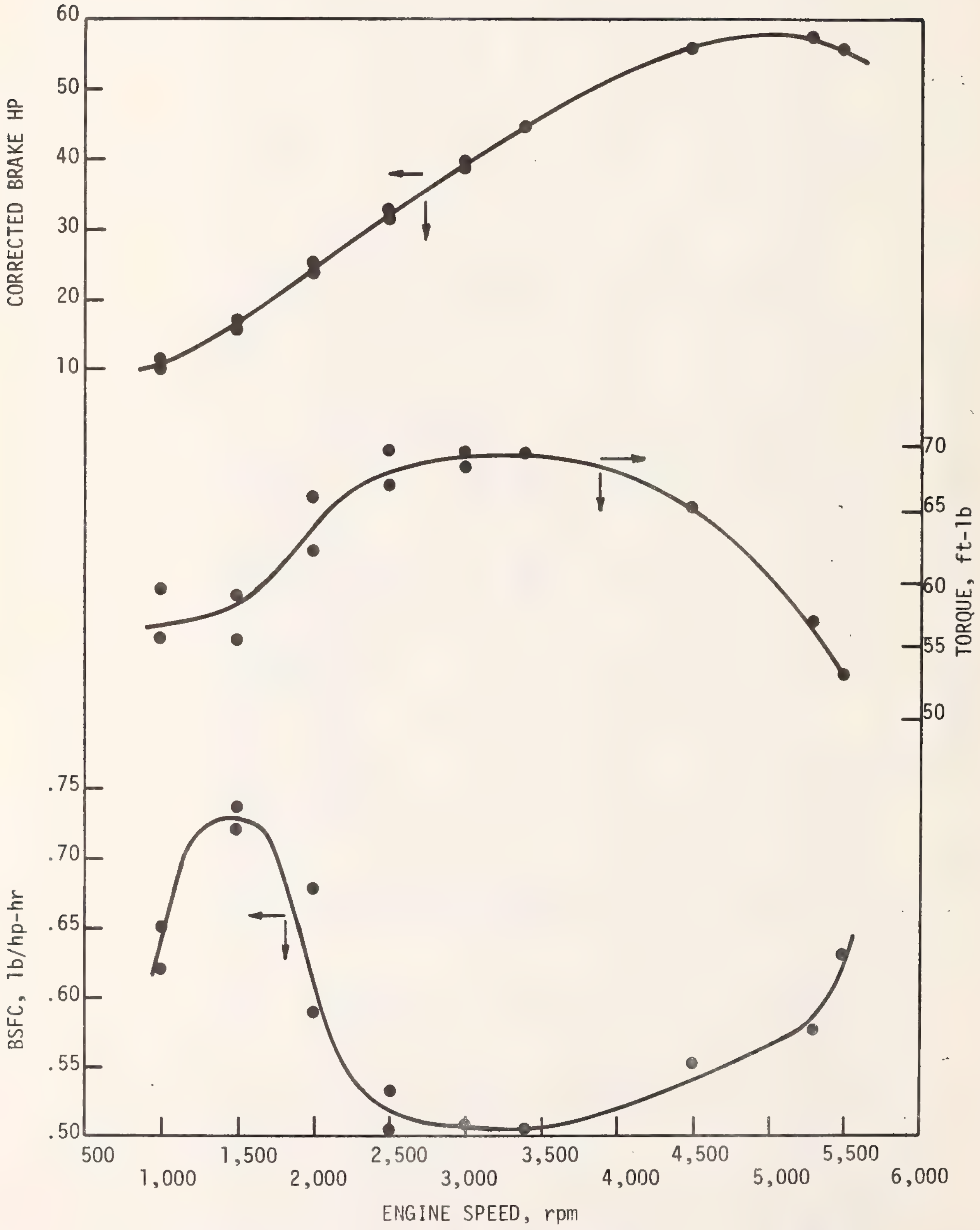


FIGURE 1. Brake Specific Fuel Consumption, Torque, and Brake Horsepower versus Engine rpm at Wide-Open-Throttle--Chevrolet 1.4 liter Engine.

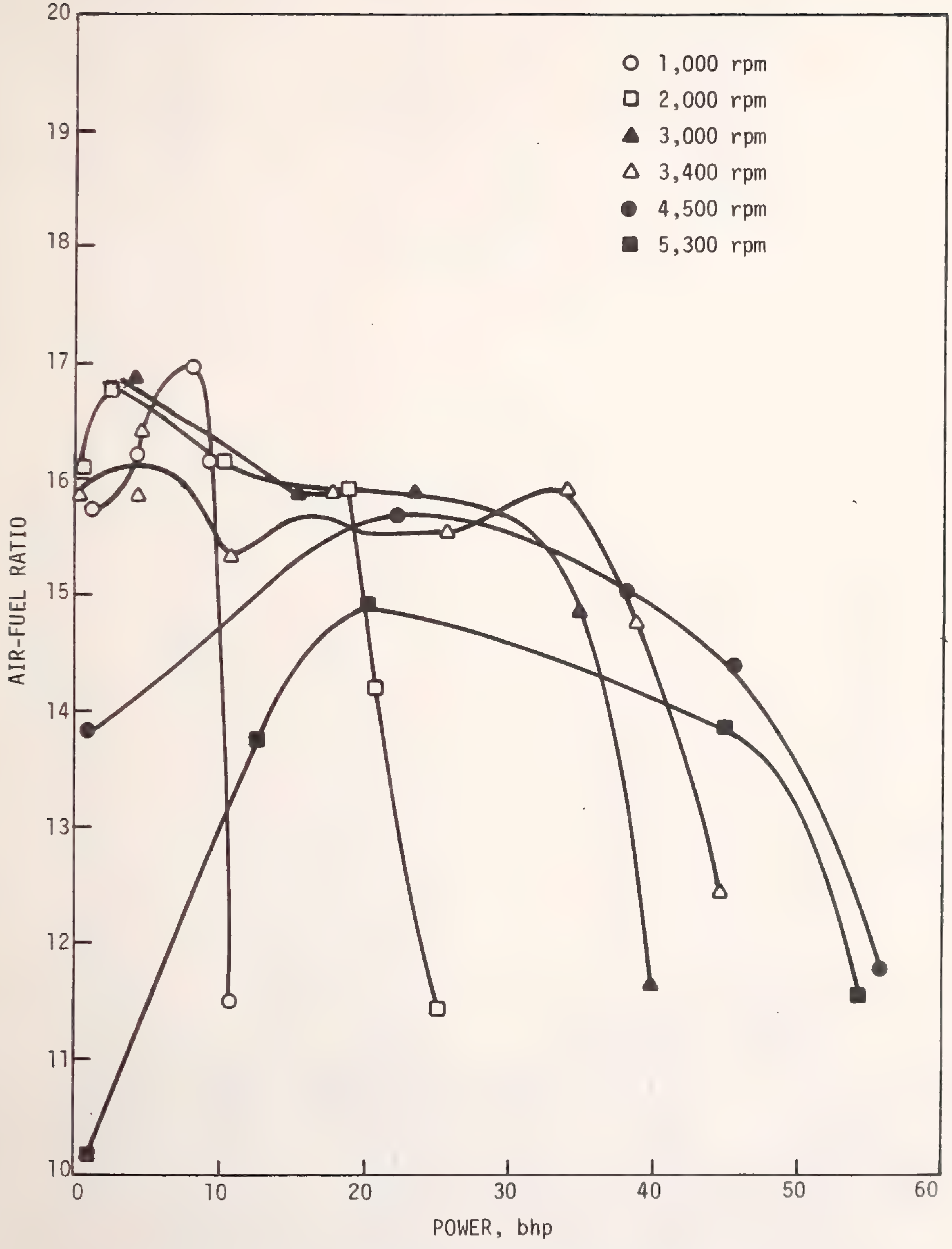


FIGURE 2. Air/Fuel Ratio versus Power at Various Speed and Load Conditions--Chevrolet 1.4 liter Engine.

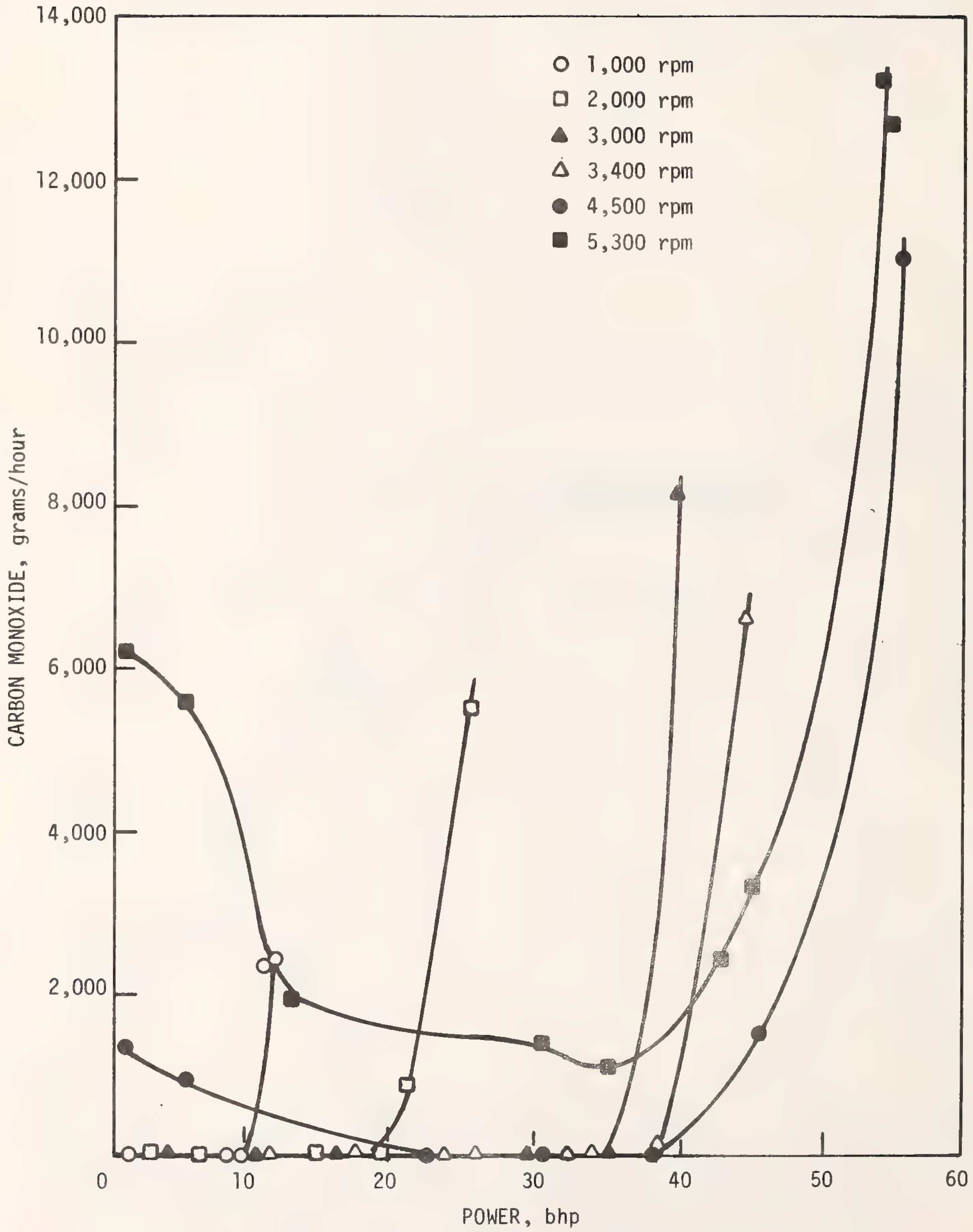


FIGURE 3. Carbon Monoxide Emissions versus Power at Various Speed and Load Conditions--Chevrolet 1.4 liter Engine.

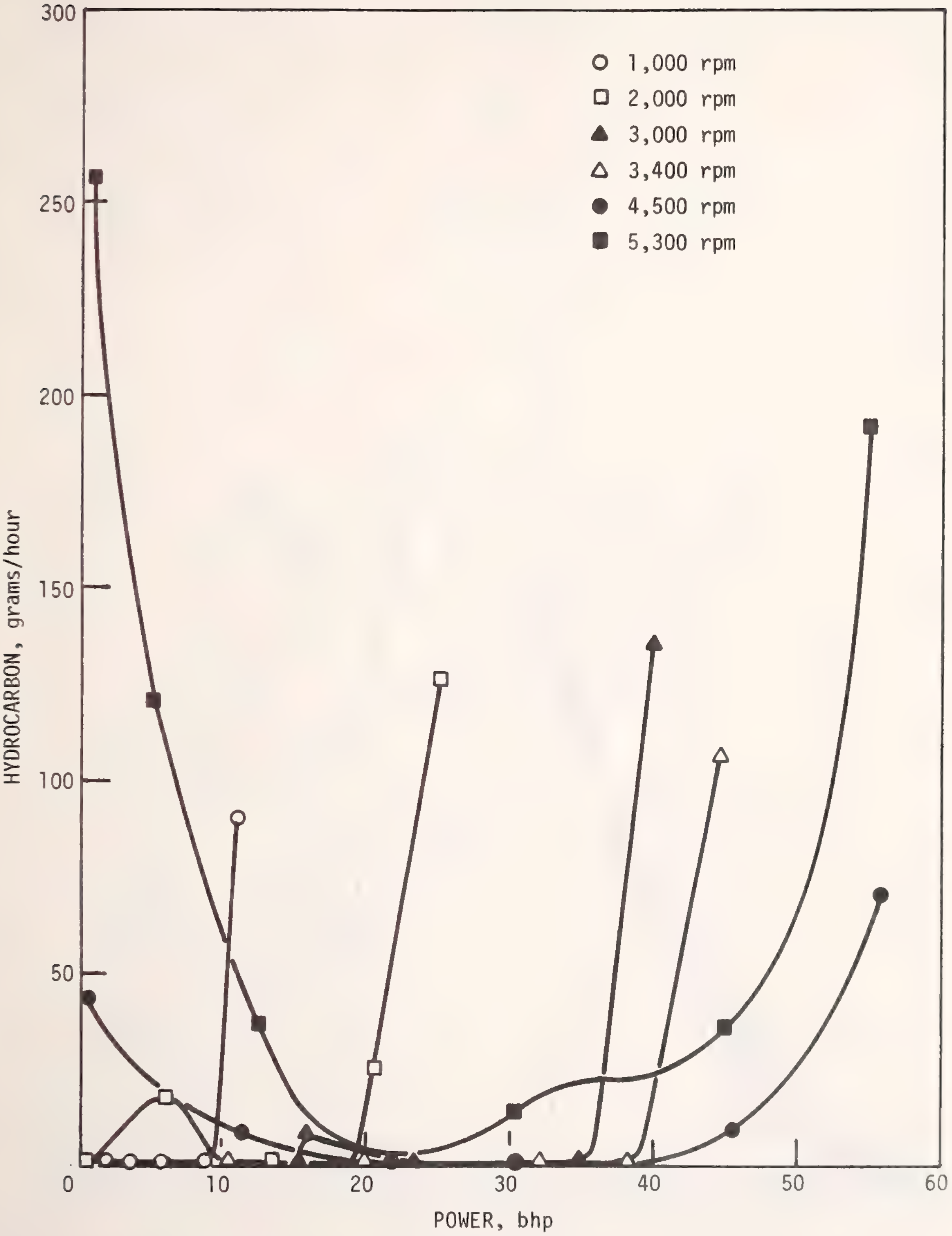


FIGURE 4. Hydrocarbon Emissions versus Power at Various Speed and Load Conditions--Chevrolet 1.4 liter Engine.

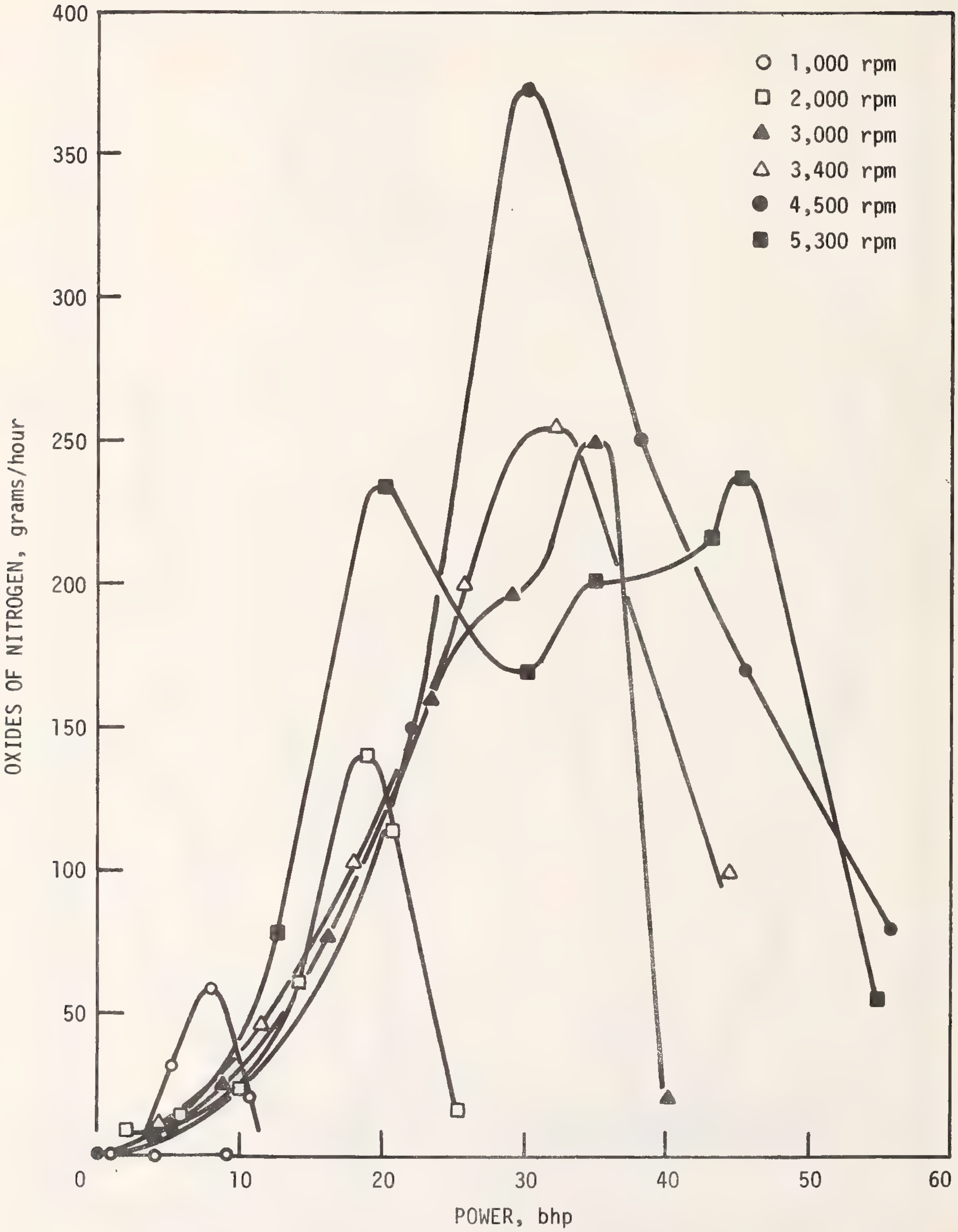


FIGURE 5. - Oxides of Nitrogen Emissions versus Power at Various Speed and Load Conditions--Chevrolet 1.4 liter Engine.

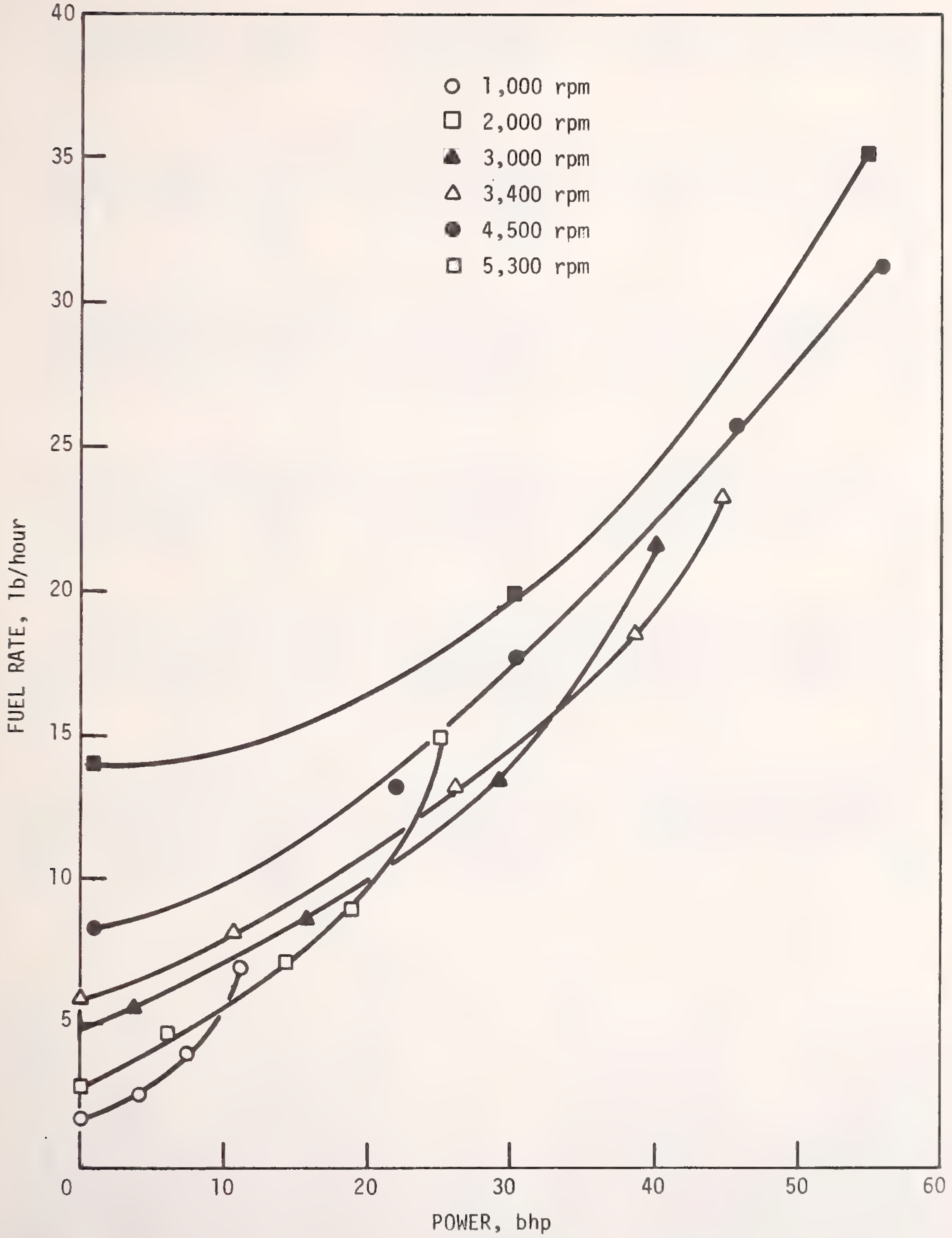


FIGURE 6. Fuel Rate versus Power at Various Speed and Load Conditions--Chevrolet 1.4 liter Engine.

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	1.1	1.2	2.1	2.2	3.1	3.2
TEST DATE	10/29/76	10/29/76	10/29/76	10/29/76	10/29/76	10/29/76
BAROMETER, MMHG	745.5	745.5	745.5	745.5	745.5	745.5
HUMIDITY, GRAINS/LB	55	55	55	55	55	55
TEMPERATURE, F	87	87	87	87	87	87
ENGINE SPEED, RPM	800	800	800	800	800	800
TORQUE, FT-LB	.0	.0	9.6	9.6	20.0	20.0
POWER, BHP*	.0	.0	1.5	1.5	3.1	3.1
FUEL RATE, LB/HR	1.3	1.3	1.7	1.7	1.8	1.8
IGNITION TIMING, DEG BTDC	10.0	10.0	10.0	10.0	10.0	10.0
MANIFOLD VACUUM, IN HG	18.5	18.5	16.0	16.0	12.5	12.5
THROTTLE ANGLE, DEG	.0	.0	1.0	1.0	2.0	2.0
INTAKE MAN. TEMP., F	117	117	132	132	135	135
CONCENTRATIONS, DRY BASIS						
CO, %	.3239	.1400	.1480	.0772	.3014	.0561
CO2, %	13.01	13.67	13.67	13.80	13.67	13.67
O2, %	2.39	2.19	1.25	1.25	1.33	1.32
HC, PPMC	5674	285	4476	2197	4908	2565
NOX, PPM	77	53	300	250	1375	1500
AIR/FUEL RATIO	15.74	16.27	15.15	15.42	15.12	15.49
EMISSION RATES, G/HR						
CO	27.7	12.0	15.3	8.2	32.9	6.3
HC	24.4	1.2	23.3	11.7	26.9	14.4
NOX+	1.0	.7	4.7	4.0	22.6	25.2
OIL TEMPERATURE, F	144	144	161	161	175	175
OIL PRESSURE, PSI	25	25	20	20	20	20
COOLANT TEMPERATURE, F	151	151	171	171	184	184
EXHAUST PRESSURE, IN. H2O	1.0	.0	1.0	.0	1.0	.0
EXHAUST TEMPERATURE, F	418	531	465	337	505	381

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	4.1	4.2	5.1	5.2	6.1	6.2
TEST DATE	10/29/76	10/29/76	10/29/76	10/29/76	10/29/76	10/29/76
BAROMETER, MMHG	745.5	745.5	745.5	745.5	745.5	745.5
HUMIDITY, GRAINS/LB	55	55	55	55	55	55
TEMPERATURE, F	74	74	76	76	76	76
ENGINE SPEED, RPM	700	700	700	700	700	700
TORQUE, FT-LB	5.0	5.0	15.0	15.0	25.0	25.0
POWER, BHP*	.7	.7	2.0	2.0	3.3	3.3
FUEL RATE, LB/HR	1.3	1.2	1.7	1.7	2.2	2.2
IGNITION TIMING, DEG BTDC	10.0	10.0	10.0	10.0	10.0	10.0
MANIFOLD VACUUM, IN HG	16.5	16.5	13.5	13.5	10.0	10.0
THROTTLE ANGLE, DEG	.0	.0	1.0	1.0	2.5	2.5
INTAKE MAN. TEMP., F	137	137	136	136	134	134
CONCENTRATIONS, DRY BASIS						
CO, %	.1180	.0193	.1465	.0378	.1227	.1740
CO2, %	13.00	13.27	13.53	13.80	13.53	13.67
O2, %	1.98	1.82	1.33	1.25	1.27	1.28
HC, PPMC	4080	886	4955	1740	4954	3593
NOX, PPM	113	150	400	540	750	752
AIR/FUEL RATIO	15.75	16.05	15.16	15.51	15.14	15.27
EMISSION RATES, G/HR						
CO	9.9	1.6	15.3	4.2	16.7	23.8
HC	17.2	3.6	25.9	9.7	33.8	24.7
NOX+	1.4	1.8	6.3	9.0	15.3	15.4
OIL TEMPERATURE, F	176	176	176	176	176	176
OIL PRESSURE, PSI	18	18	16	16	17	17
COOLANT TEMPERATURE, F	182	182	182	182	181	181
EXHAUST PRESSURE, IN. H2O	1.0	.0	1.0	.0	1.0	.0
EXHAUST TEMPERATURE, F	437	374	444	392	480	382

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	7.1	7.2	8.1	8.2	9.1	9.2
TEST DATE	10/29/76	10/29/76	10/29/76	10/29/76	10/29/76	10/29/76
BAROMETER, MMHG	752.0	752.0	745.5	745.5	745.5	745.5
HUMIDITY, GRAINS/LB	40	40	55	55	55	55
TEMPERATURE, F	84	84	81	81	82	82
ENGINE SPEED, RPM	1000	1000	1000	1000	1000	1000
TORQUE, FT-LB	60.0	60.0	48.0	48.0	40.3	40.3
POWER, BHP*	11.3	11.3	9.1	9.1	7.7	7.7
FUEL RATE, LB/HR	7.0	7.0	4.6	4.6	4.0	4.3
IGNITION TIMING, DEG BTDC	10.0	10.0	10.0	10.0	10.0	10.0
MANIFOLD VACUUM, IN HG	.0	.0	1.5	1.5	3.5	3.5
THROTTLE ANGLE, DEG	75.0	75.0	16.5	16.5	13.0	13.0
INTAKE MAN. TEMP., F	95	95	136	136	140	140
CONCENTRATIONS, DRY BASIS						
CO, %	7.3800	6.9500	.0748	.0050	.0724	.0050
CO2, %	10.40	10.40	13.00	13.40	13.14	13.00
O2, %	.38	.25	2.29	1.78	2.54	2.50
HC, PPMC	5045	5266	3286	85	2751	71
NOX, PPM	480	405	890	1625	750	1750
AIR/FUEL RATIO	11.71	11.73	16.12	16.16	16.35	16.75
EMISSION RATES, G/HR						
CO	2507.2	2381.2	22.6	1.5	19.6	1.5
HC	86.1	90.6	49.8	1.3	37.3	1.1
NOX+	23.0	19.6	40.4	73.8	30.5	78.2
OIL TEMPERATURE, F	165	165	181	181	184	184
OIL PRESSURE, PSI	25	25	25	25	24	24
COOLANT TEMPERATURE, F	176	176	176	176	177	177
EXHAUST PRESSURE, IN. H2O	6.0	5.0	6.0	5.0	5.0	4.0
EXHAUST TEMPERATURE, F	765	667	795	726	772	706

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	10.1	10.2	11.1	11.2	12.1	12.2
TEST DATE	10/29/76	10/29/76	10/29/76	10/29/76	10/29/76	10/29/76
BAROMETER, MMHG	745.5	745.5	745.5	745.5	745.5	745.5
HUMIDITY, GRAINS/LB	55	55	53	53	53	53
TEMPERATURE, F	82	82	78	78	78	78
ENGINE SPEED, RPM	1000	1000	1000	1000	1000	1000
TORQUE, FT-LB	32.3	32.3	21.5	21.5	13.5	13.5
POWER, BHP*	6.1	6.1	4.1	4.1	2.6	2.6
FUEL RATE, LB/HR	3.5	3.4	2.5	2.5	2.3	2.3
IGNITION TIMING, DEG BTDC	22.0	22.0	15.0	15.0	15.0	15.0
MANIFOLD VACUUM, IN HG	7.5	7.5	13.5	13.5	15.5	15.5
THROTTLE ANGLE, DEG	11.1	11.1	8.5	8.5	6.0	6.0
INTAKE MAN. TEMP., F	137	137	134	134	127	127
CONCENTRATIONS, DRY BASIS						
CO, %	.0724	.0073	.0820	.0050	.0940	.0049
CO2, %	12.38	12.75	13.14	13.53	13.27	13.67
O2, %	2.70	2.50	2.20	1.90	2.23	1.32
HC, PPMC	3324	73	3687	85	2954	160
NOX, PPM	690	665	590	600	400	290
AIR/FUEL RATIO	16.49	16.75	15.98	16.20	16.06	15.75
EMISSION RATES, G/HR						
CO	17.2	1.7	13.6	.8	14.2	.7
HC	39.6	.9	30.7	.7	22.4	1.2
NOX+	24.6	23.1	14.6	14.8	9.0	6.4
OIL TEMPERATURE, F	184	184	178	178	167	167
OIL PRESSURE, PSI	25	25	25	25	27	27
COOLANT TEMPERATURE, F	177	177	174	174	167	167
EXHAUST PRESSURE, IN. H2O	4.0	3.0	2.0	1.0	2.0	1.0
EXHAUST TEMPERATURE, F	684	678	595	602	584	504

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	13.1	13.2	14.1	14.2	15.1	15.2
TEST DATE	10/29/76	10/29/76	10/29/76	10/29/76	11/ 1/76	11/ 1/76
BAROMETER, MMHG	745.5	745.5	745.5	745.5	752.0	752.0
HUMIDITY, GRAINS/LB	53	53	53	53	40	40
TEMPERATURE, F	78	78	78	78	88	88
ENGINE SPEED, RPM	1000	1000	1000	1000	1500	1500
TORQUE, FT-LB	5.4	5.4	.0	.0	61.0	61.0
POWER, BHP*	1.0	1.0	.0	.0	17.3	17.3
FUEL RATE, LB/HR	2.2	2.1	2.1	1.7	12.5	12.6
IGNITION TIMING, DEG BTDC	11.0	11.0	10.0	10.0	14.0	14.0
MANIFOLD VACUUM, IN HG	17.0	17.0	18.0	18.0	.0	.0
THROTTLE ANGLE, DEG	5.0	5.0	4.5	4.5	75.0	75.0
INTAKE MAN. TEMP., F	125	125	124	124	96	96
CONCENTRATIONS, DRY BASIS						
CO, %	.1230	.0049	.1650	.0049	11.9100	12.1400
CO2, %	13.40	13.67	13.27	13.67	7.68	7.93
O2, %	1.40	1.33	1.40	1.40	.25	.13
HC, PPMC	2503	137	2273	142	6451	5451
NOX, PPM	190	160	100	80	54	46
AIR/FUEL RATIO	15.49	15.75	15.50	15.80	9.93	9.95
EMISSION RATES, G/HR						
CO	16.9	.7	22.6	.5	6282.8	6477.4
HC	17.2	.9	15.6	.8	170.9	146.1
NOX+	3.9	3.2	2.0	1.3	4.0	3.5
OIL TEMPERATURE, F	165	165	161	161	206	206
OIL PRESSURE, PSI	29	29	29	29	29	29
COOLANT TEMPERATURE, F	158	158	154	154	191	191
EXHAUST PRESSURE, IN. H2O	1.0	.0	1.0	.0	11.0	6.0
EXHAUST TEMPERATURE, F	577	487	536	464	918	836

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	16.1	16.2	24.1	24.2	25.1	25.2
TEST DATE	11/ 1/76	11/ 1/76	11/ 1/76	11/ 1/76	11/ 1/76	11/ 1/76
BAROMETER, MMHG	745.5	745.5	748.2	748.2	748.2	748.2
HUMIDITY, GRAINS/LB	53	53	56	56	56	56
TEMPERATURE, F	81	81	84	84	88	88
ENGINE SPEED, RPM	1500	1500	2000	2000	2000	2000
TORQUE, FT-LB	50.0	50.0	54.4	54.4	46.5	46.5
POWER, BHP*	14.2	14.2	20.6	20.6	17.7	17.7
FUEL RATE, LB/HR	7.3	7.3	10.0	9.9	8.7	8.6
IGNITION TIMING, DEG BTDC	14.0	14.0	18.0	18.0	19.0	19.0
MANIFOLD VACUUM, IN HG	3.5	3.5	3.0	3.0	4.5	4.5
THROTTLE ANGLE, DEG	18.0	18.0	24.0	24.0	18.5	18.5
INTAKE MAN. TEMP., F	136	136	137	137	107	107
CONCENTRATIONS, DRY BASIS						
CO, %	.7625	.3150	1.6000	1.4700	.1350	.0049
CO2, %	13.93	14.63	13.66	13.93	13.80	14.08
O2, %	.60	.35	.45	.10	1.34	1.23
HC, PPMC	665	5181	2501	864	1884	57
NOX, PPM	2275	825	2050	1300	1300	1450
AIR/FUEL RATIO	14.88	14.43	14.23	14.20	15.53	15.71
EMISSION RATES, G/HR						
CO	338.4	135.2	932.6	846.0	74.5	2.7
HC	14.8	111.7	73.2	25.0	52.2	1.6
NOX+	150.7	52.8	180.3	112.9	108.2	120.7
OIL TEMPERATURE, F	174	174	207	207	167	167
OIL PRESSURE, PSI	33	33	40	40	40	40
COOLANT TEMPERATURE, F	172	172	184	184	167	167
EXHAUST PRESSURE, IN. H20	9.0	4.0	15.0	7.0	16.0	8.0
EXHAUST TEMPERATURE, F	972	902	1057	962	1078	956

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	26.1	26.2	27.1	27.2	28.1	28.2
TEST DATE	11/ 1/76	11/ 1/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76
BAROMETER, MMHG	748.2	748.2	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	56	56	56	56	56	56
TEMPERATURE, F	87	87	78	78	85	85
ENGINE SPEED, RPM	2000	2000	2000	2000	2000	2000
TORQUE, FT-LB	37.2	37.2	24.8	24.8	15.5	15.5
POWER, BHP*	14.2	14.2	9.3	9.3	5.9	5.9
FUEL RATE, LB/HR	7.1	7.2	5.8	5.8	4.7	4.6
IGNITION TIMING, DEG BTDC	24.5	24.5	34.0	34.0	32.5	32.5
MANIFOLD VACUUM, IN HG	6.5	6.5	9.8	9.8	13.0	13.0
THROTTLE ANGLE, DEG	14.5	14.5	10.0	10.0	8.0	8.0
INTAKE MAN. TEMP., F	136	136	146	146	144	144
CONCENTRATIONS, DRY BASIS						
CO, %	.1180	.0049	.1465	.0049	.2340	.0049
CO2, %	13.53	13.94	12.62	13.01	12.62	13.14
O2, %	1.75	1.50	2.75	2.50	3.00	2.50
HC, PPMC	2391	69	3163	62	3108	1111
NOX, PPM	875	875	320	290	240	300
AIR/FUEL RATIO	15.77	15.89	16.45	16.70	16.59	16.55
EMISSION RATES, G/HR						
CO	54.3	2.3	57.2	1.9	74.3	1.5
HC	55.3	1.6	62.0	1.2	49.6	17.6
NOX+	60.8	61.3	18.9	17.3	11.5	14.3
OIL TEMPERATURE, F	200	200	200	200	198	198
OIL PRESSURE, PSI	40	40	40	40	40	40
COOLANT TEMPERATURE, F	184	184	182	182	182	182
EXHAUST PRESSURE, IN. H2O	13.0	5.0	9.0	3.0	6.0	2.0
EXHAUST TEMPERATURE, F	985	917	947	852	880	822

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	29.1	29.2	30.1	30.2	31.1	31.2
TEST DATE	11/ 1/76	11/ 1/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	752.0	752.0
HUMIDITY, GRAINS/LB	56	56	56	56	44	44
TEMPERATURE, F	76	76	77	77	90	90
ENGINE SPEED, RPM	2000	2000	2000	2000	2500	2500
TORQUE, FT-LB	6.2	6.2	.9	.9	70.6	70.6
POWER, BHP*	2.3	2.3	.3	.3	33.4	33.4
FUEL RATE, LB/HR	3.3	3.2	2.6	2.9	18.1	18.1
IGNITION TIMING, DEG BTDC	32.0	32.0	33.0	33.0	20.0	20.0
MANIFOLD VACUUM, IN HG	19.8	19.8	20.6	20.6	.0	.0
THROTTLE ANGLE, DEG	5.0	5.0	4.0	4.0	75.0	75.0
INTAKE MAN. TEMP., F	116	116	119	119	87	87
CONCENTRATIONS, DRY BASIS						
CO, %	.1680	.0049	.1890	.0049	7.5900	7.8400
CO2, %	12.75	12.75	13.14	13.27	10.30	10.19
O2, %	3.00	2.50	1.75	1.75	.25	.13
HC, PPMC	1640	59	1419	72	3239	2895
NOX, PPM	310	330	175	165	310	155
AIR/FUEL RATIO	16.80	16.74	15.85	16.10	11.68	11.55
EMISSION RATES, G/HR						
CO	37.8	1.1	32.5	.9	6659.7	6824.5
HC	18.5	.6	12.3	.7	142.7	126.5
NOX+	10.5	10.9	4.5	4.7	39.0	19.4
OIL TEMPERATURE, F	194	194	194	194	214	214
OIL PRESSURE, PSI	40	40	40	40	39	39
COOLANT TEMPERATURE, F	182	182	182	182	191	191
EXHAUST PRESSURE, IN. H2O	3.0	1.0	3.0	1.0	30.0	19.0
EXHAUST TEMPERATURE, F	777	705	767	672	1111	1024

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	32.1	32.2	33.1	33.2	34.1	34.2
TEST DATE	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/22/76
BAROMETER, MMHG	748.8	748.2	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	62	62	62	62	62	62
TEMPERATURE, F	90	90	87	87	86	86
ENGINE SPEED, RPM	2500	2500	2500	2500	2500	2500
TORQUE, FT-LB	59.4	59.4	49.5	49.5	39.6	39.6
POWER, BHP*	28.3	28.4	23.6	23.6	18.8	18.8
FUEL RATE, LB/HR	13.0	13.0	11.1	11.2	8.9	8.7
IGNITION TIMING, DEG BTDC	20.0	20.0	20.0	20.0	32.0	32.0
MANIFOLD VACUUM, IN HG	2.0	2.0	4.0	4.0	7.5	7.5
THROTTLE ANGLE, DEG	36.0	36.0	26.0	26.0	22.0	22.0
INTAKE MAN. TEMP., F	92	92	102	102	130	130
CONCENTRATIONS, DRY BASIS						
CO, %	.4664	.0073	.1534	.0049	.1230	.0049
CO2, %	13.67	14.35	13.53	13.94	13.40	14.49
O2, %	1.00	.50	1.25	1.25	1.25	.13
HC, PPMC	2171	57	1595	46	1991	56
NOX, PPM	2550	2500	1600	1650	1175	1175
AIR/FUEL RATIO	15.14	15.23	15.51	15.74	15.47	14.93
EMISSION RATES, G/HR						
CO	374.6	5.9	107.9	3.5	69.4	2.6
HC	87.6	2.3	56.3	1.6	56.4	1.5
NOX+	317.6	312.5	174.5	183.7	102.7	96.8
OIL TEMPERATURE, F	211	211	214	214	214	214
OIL PRESSURE, PSI	40	40	40	40	40	40
COOLANT TEMPERATURE, F	182	182	182	182	182	182
EXHAUST PRESSURE, IN. H20	30.0	16.0	22.0	15.0	15.0	8.0
EXHAUST TEMPERATURE, F	1212	1146	1196	1117	1064	1084

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	35.1	35.2	36.1	36.2	37.1	37.2
TEST DATE	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	62	62	62	62	62	62
TEMPERATURE, F	84	84	79	79	76	76
ENGINE SPEED, RPM	2500	2500	2500	2500	2500	2500
TORQUE, FT-LB	26.0	26.0	16.5	16.5	6.6	6.6
POWER, BHP*	12.3	12.3	7.8	7.8	3.1	3.1
FUEL RATE, LB/HR	6.8	6.8	5.8	5.8	3.8	3.8
IGNITION TIMING, DEG BTDC	33.0	33.0	33.0	33.0	35.0	35.0
MANIFOLD VACUUM, IN HG	11.0	11.0	12.5	12.5	19.5	19.5
THROTTLE ANGLE, DEG	19.0	19.0	14.7	14.7	9.9	9.9
INTAKE MAN. TEMP., F	146	146	152	152	117	117
CONCENTRATIONS, DRY BASIS						
CO, %	.1443	.0049	.2205	.0049	.2100	.0049
CO2, %	13.53	13.94	12.75	13.27	12.62	12.75
O2, %	1.50	1.50	2.50	2.00	2.75	3.00
HC, PPMC	2563	91	3395	114	961	54
NOX, PPM	500	500	2000	240	250	250
AIR/FUEL RATIO	15.55	15.87	16.24	16.28	16.69	17.12
EMISSION RATES, G/HR						
CO	62.6	2.2	85.9	1.9	55.4	1.3
HC	55.9	2.0	66.4	2.2	12.7	.7
NOX+	33.7	34.2	120.8	14.3	10.2	10.4
OIL TEMPERATURE, F	208	208	206	206	204	204
OIL PRESSURE, PSI	42	42	42	42	44	44
COOLANT TEMPERATURE, F	185	185	182	182	182	182
EXHAUST PRESSURE, IN. H2O	10.0	5.0	8.0	4.0	4.0	2.0
EXHAUST TEMPERATURE, F	998	950	982	906	920	866

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	38.1	38.2	39.1	39.2	40.1	40.2
TEST DATE	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76
BAROMETER, MMHG	748.8	748.8	752.0	752.0	748.8	748.8
HUMIDITY, GRAINS/LB	62	62	44	44	62	62
TEMPERATURE, F	76	76	88	88	88	88
ENGINE SPEED, RPM	2500	2500	3000	3000	3000	3000
TORQUE, FT-LB	3.0	3.0	70.6	70.6	61.2	61.2
POWER, BHP*	1.4	1.4	40.0	40.0	35.0	35.0
FUEL RATE, LB/HR	3.3	3.4	21.4	21.6	16.5	16.4
IGNITION TIMING, DEG BTDC	35.0	35.0	21.0	21.0	21.5	21.5
MANIFOLD VACUUM, IN HG	21.0	21.0	1.0	1.0	2.0	2.0
THROTTLE ANGLE, DEG	8.0	8.0	75.0	75.0	40.0	40.0
INTAKE MAN. TEMP., F	117	117	85	85	87	87
CONCENTRATIONS, DRY BASIS						
CO, %	.7520	.0049	7.7900	7.7700	.8140	.0040
CO2, %	14.08	14.49	10.19	10.19	13.80	14.92
O2, %	.03	1.50	.38	.25	.75	.02
HC, PPMC	1838	64	3152	2579	1490	20
NOX, PPM	270	290	315	130	2400	1625
AIR/FUEL RATIO	14.33	15.83	11.68	11.65	14.88	14.87
EMISSION RATES, G/HR						
CO	147.0	1.1	8080.7	8122.7	818.1	4.0
HC	18.0	.7	164.2	135.4	75.2	1.0
NOX+	8.2	9.9	46.9	19.5	374.0	249.6
OIL TEMPERATURE, F	202	202	222	222	195	195
OIL PRESSURE, PSI	44	44	40	40	44	44
COOLANT TEMPERATURE, F	182	182	191	191	184	184
EXHAUST PRESSURE, IN. H2O	3.0	1.0	40.0	26.0	42.0	25.0
EXHAUST TEMPERATURE, F	834	765	1166	1104	1300	1256

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	41.1	41.2	42.1	42.2	43.1	43.2
TEST DATE	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	62	62	62	62	62	62
TEMPERATURE, F	88	88	85	85	82	82
ENGINE SPEED, RPM	3000	3000	3000	3000	3000	3000
TORQUE, FT-LB	51.0	51.0	40.8	40.8	27.0	27.0
POWER, BHP*	29.1	29.1	23.3	23.3	15.3	15.3
FUEL RATE, LB/HR	13.9	13.5	10.4	10.5	8.9	8.9
IGNITION TIMING, DEG BTDC	23.0	23.0	33.0	33.0	36.0	36.0
MANIFOLD VACUUM, IN HG	3.5	3.5	7.5	7.5	10.5	10.5
THROTTLE ANGLE, DEG	29.0	29.0	18.0	18.0	15.0	15.0
INTAKE MAN. TEMP., F	120	120	124	124	132	132
CONCENTRATIONS, DRY BASIS						
CO, %	.1810	.0049	.1330	.0049	.1420	.0049
CO2, %	13.94	14.35	13.80	14.08	13.80	14.21
O2, %	1.50	1.00	1.55	1.48	1.50	1.49
HC, PPMC	1121	25	1712	38	1781	49
NOX, PPM	1500	1500	1450	1500	875	900
AIR/FUEL RATIO	15.70	15.54	15.70	15.89	15.63	15.86
EMISSION RATES, G/HR						
CO	161.0	4.2	89.0	3.3	81.0	2.8
HC	50.1	1.1	57.5	1.3	51.0	1.4
NOX+	206.9	198.3	150.4	158.7	77.4	80.3
OIL TEMPERATURE, F	215	215	217	217	215	215
OIL PRESSURE, PSI	44	44	42	42	45	45
COOLANT TEMPERATURE, F	182	182	184	184	184	184
EXHAUST PRESSURE, IN. H2O	33.0	21.0	20.0	12.0	15.0	8.0
EXHAUST TEMPERATURE, F	1285	1204	1134	1065	1092	994

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	44.1	44.2	45.1	45.2	48.1	48.2
TEST DATE	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	62	62	62	62	62	62
TEMPERATURE, F	78	78	78	78	92	92
ENGINE SPEED, RPM	3000	3000	3000	3000	3400	3400
TORQUE, FT-LB	17.0	17.0	6.8	6.8	59.4	59.4
POWER, BHP*	9.6	9.6	3.9	3.9	38.6	38.6
FUEL RATE, LB/HR	6.6	6.7	5.4	5.4	18.5	18.5
IGNITION TIMING, DEG BTDC	35.0	35.0	35.0	35.0	25.0	25.0
MANIFOLD VACUUM, IN HG	15.0	15.0	16.0	16.0	2.0	2.0
THROTTLE ANGLE, DEG	10.0	10.0	9.0	9.0	43.0	43.0
INTAKE MAN. TEMP., F	151	151	158	158	94	94
CONCENTRATIONS, DRY BASIS						
CO, %	.7570	.1890	.3550	.0049	1.3000	.0910
CO2, %	14.21	15.21	12.38	13.53	13.67	15.06
O2, %	.25	.00	2.75	2.42	.50	.00
HC, PPMC	2415	58	5643	63	1492	14
NOX, PPM	213	130	93	123	2425	550
AIR/FUEL RATIO	14.42	14.73	16.04	16.56	14.50	14.79
EMISSION RATES, G/HR						
CO	294.1	75.2	126.4	1.8	1423.0	100.9
HC	47.1	1.2	100.9	1.1	82.0	.8
NOX+	12.8	8.0	5.1	6.9	411.5	94.6
OIL TEMPERATURE, F	210	210	207	207	231	231
OIL PRESSURE, PSI	44	44	44	44	44	44
COOLANT TEMPERATURE, F	185	185	184	184	185	185
EXHAUST PRESSURE, IN. H2O	8.0	3.0	7.0	3.0	53.0	35.0
EXHAUST TEMPERATURE, F	1022	950	1032	977	1346	1365

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	49.1	49.2	50.1	50.2	51.1	51.2
TEST DATE	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	62	62	62	62	62	62
TEMPERATURE, F	90	90	88	88	84	84
ENGINE SPEED, RPM	3400	3400	3400	3400	3400	3400
TORQUE, FT-LB	49.5	49.5	39.6	39.6	26.4	26.4
POWER, BHP*	32.1	32.1	25.6	25.6	17.0	17.0
FUEL RATE, LB/HR	15.7	15.9	13.2	13.3	10.0	10.1
IGNITION TIMING, DEG BTDC	25.0	25.0	30.0	30.0	38.0	38.0
MANIFOLD VACUUM, IN HG	3.5	3.5	6.5	6.5	11.0	11.0
THROTTLE ANGLE, DEG	32.0	32.0	23.0	23.0	16.0	16.0
INTAKE MAN. TEMP., F	102	102	117	117	130	130
CONCENTRATIONS, DRY BASIS						
CO, %	.1682	.0049	.1465	.0024	.1510	.0049
CO2, %	13.94	14.21	13.94	14.08	13.80	14.08
O2, %	1.49	1.45	1.50	1.00	1.55	1.00
HC, PPMC	800	16	972	27	1713	43
NOX, PPM	1650	1600	1400	1525	1000	1050
AIR/FUEL RATIO	15.74	15.86	15.73	15.56	15.67	15.54
EMISSION RATES, G/HR						
CO	169.5	5.0	123.7	2.0	96.7	3.1
HC	40.5	.8	41.2	1.2	55.1	1.4
NOX+	257.8	254.3	183.2	199.6	99.3	104.2
OIL TEMPERATURE, F	227	227	226	226	222	222
OIL PRESSURE, PSI	45	45	46	46	47	47
COOLANT TEMPERATURE, F	184	184	184	184	184	184
EXHAUST PRESSURE, IN. H2O	42.0	27.0	29.0	19.0	18.0	8.0
EXHAUST TEMPERATURE, F	1342	1242	1246	1167	1134	1044

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	52.1	52.2	53.1	53.2	54.1	54.2
TEST DATE	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76	11/ 2/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	62	62	62	62	62	62
TEMPERATURE, F	82	82	79	79	78	78
ENGINE SPEED, RPM	3400	3400	3400	3400	3400	3400
TORQUE, FT-LB	16.5	16.5	6.6	6.6	.0	.0
POWER, BHP*	10.6	10.6	4.2	4.2	.0	.0
FUEL RATE, LB/HR	8.3	8.3	6.4	6.4	5.9	5.9
IGNITION TIMING, DEG BTDC	38.0	38.0	38.0	38.0	38.0	38.0
MANIFOLD VACUUM, IN HG	13.6	13.6	16.0	16.0	17.1	17.2
THROTTLE ANGLE, DEG	12.5	12.5	9.8	9.8	9.0	9.0
INTAKE MAN. TEMP., F	140	140	152	152	158	158
CONCENTRATIONS, DRY BASIS						
CO, %	.2320	.0024	.2900	.0024	.3600	.0024
CO2, %	13.94	14.50	13.53	13.94	13.14	13.80
O2, %	1.00	.75	1.56	1.50	1.75	1.50
HC, PPMC	1716	52	1596	57	3409	57
NOX, PPM	490	500	180	190	110	130
AIR/FUEL RATIO	15.23	15.33	15.61	15.87	15.52	15.88
EMISSION RATES, G/HR						
CO	119.6	1.2	118.7	1.0	135.2	.9
HC	44.4	1.3	32.8	1.2	64.3	1.1
NOX+	39.2	40.3	11.4	12.2	6.4	7.7
OIL TEMPERATURE, F	218	218	214	214	212	212
OIL PRESSURE, PSI	45	45	45	45	45	45
COOLANT TEMPERATURE, F	184	184	183	183	183	183
EXHAUST PRESSURE, IN. H2O	11.0	4.0	9.0	4.0	8.0	3.0
EXHAUST TEMPERATURE, F	1092	987	1082	944	1072	974

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	56.1	56.2	57.1	57.2	58.1	58.2
TEST DATE	11/ 3/76	11/ 3/76	11/ 3/76	11/ 3/76	11/ 3/76	11/ 3/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	53	53	53	53	53	53
TEMPERATURE, F	92	92	100	100	97	97
ENGINE SPEED, RPM	4500	4500	4500	4500	4500	4500
TORQUE, FT-LB	53.0	53.0	44.0	44.0	35.0	35.0
POWER, BHP*	45.5	45.5	38.1	38.1	30.2	30.2
FUEL RATE, LB/HR	23.3	25.8	19.9	19.9	17.7	17.7
IGNITION TIMING, DEG BTDC	29.0	29.0	27.0	27.0	55.0	55.0
MANIFOLD VACUUM, IN HG	3.5	3.5	4.5	4.5	6.2	6.2
THROTTLE ANGLE, DEG	41.0	41.0	34.0	34.0	29.0	29.0
INTAKE MAN. TEMP., F	100	100	117	117	120	120
CONCENTRATIONS, DRY BASIS						
CO, %	1.4400	.9900	.4740	.0049	.2259	.0024
CO2, %	13.26	13.93	13.80	14.35	13.53	13.80
O2, %	.50	.05	.65	.25	1.00	.90
HC, PPMC	1603	115	1144	17	912	25
NOX, PPM	2400	750	1725	1375	2075	2225
AIR/FUEL RATIO	14.41	14.42	14.98	15.03	15.39	15.53
EMISSION RATES, G/HR						
CO	1980.6	1503.6	578.0	6.0	252.6	2.7
HC	110.7	8.8	70.1	1.1	51.2	1.4
NOX+	491.9	169.7	313.5	250.5	345.8	372.8
OIL TEMPERATURE, F	216	216	247	247	246	246
OIL PRESSURE, PSI	47	47	46	46	45	45
COOLANT TEMPERATURE, F	188	188	186	186	187	187
EXHAUST PRESSURE, IN. H2O	73.0	48.0	58.0	38.0	45.0	29.0
EXHAUST TEMPERATURE, F	1418	1356	1411	1348	1347	1241

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	59.1	59.2	60.1	60.2	62.1	62.2
TEST DATE	11/ 3/76	11/ 3/76	11/ 3/76	11/ 3/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	752.5	752.5
HUMIDITY, GRAINS/LB	53	53	53	53	44	44
TEMPERATURE, F	96	96	97	97	81	81
ENGINE SPEED, RPM	4500	4500	4500	4500	4500	4500
TORQUE, FT-LB	23.0	23.0	14.0	14.0	.9	.9
POWER, BHP*	19.8	19.8	12.1	12.1	.8	.8
FUEL RATE, LB/HR	14.4	14.5	12.3	13.0	8.3	8.3
IGNITION TIMING, DEG BTDC	47.0	47.0	42.0	42.0	40.0	40.0
MANIFOLD VACUUM, IN HG	10.0	10.0	13.2	13.2	18.0	18.0
THROTTLE ANGLE, DEG	22.0	22.0	17.0	17.0	11.5	11.5
INTAKE MAN. TEMP., F	126	126	134	134	152	152
CONCENTRATIONS, DRY BASIS						
CO, %	.2132	.0024	1.9300	4.1800	3.5500	2.9600
CO2, %	13.53	13.80	13.66	12.75	12.50	12.75
O2, %	1.15	.90	.25	.05	.15	.01
HC, PPMC	1026	25	2304	19	3736	1895
NOX, PPM	1875	1775	77	78	107	56
AIR/FUEL RATIO	15.48	15.51	13.93	13.14	13.09	13.38
EMISSION RATES, G/HR						
CO	194.2	2.2	1350.0	2906.5	1587.5	1345.8
HC	46.9	1.2	80.9	.7	83.9	43.3
NOX+	254.5	243.2	8.0	8.0	6.9	3.7
OIL TEMPERATURE, F	244	244	234	234	236	236
OIL PRESSURE, PSI	47	47	46	46	45	45
COOLANT TEMPERATURE, F	187	187	186	186	185	185
EXHAUST PRESSURE, IN. H2O	29.0	18.0	18.0	13.0	7.0	4.0
EXHAUST TEMPERATURE, F	1261	1174	1186	1056	1094	971

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER

FUEL CODE: 7619

TEST NUMBER	63.1	63.2	64.1	64.2	65.1	65.2
TEST DATE	11/11/76	11/11/76	11/ 4/76	11/ 4/76	11/ 3/76	11/ 3/76
BAROMETER, MMHG	752.0	752.0	748.8	748.8	752.5	748.8
HUMIDITY, GRAINS/LB	44	44	53	53	52	53
TEMPERATURE, F	92	92	90	90	97	97
ENGINE SPEED, RPM	5300	5300	5300	5300	5300	5300
TORQUE, FT-LB	54.0	54.0	44.6	44.6	34.4	34.4
POWER, BHP*	54.3	54.3	45.0	45.0	34.8	34.9
FUEL RATE, LB/HR	34.5	34.5	26.6	26.7	22.4	22.2
IGNITION TIMING, DEG BTDC	28.0	28.0	27.0	27.0	32.0	32.0
MANIFOLD VACUUM, IN HG	2.2	2.2	3.5	3.5	5.6	5.6
THROTTLE ANGLE, DEG	75.0	75.0	48.0	48.0	41.5	41.5
INTAKE MAN. TEMP., F	86	86	96	96	118	118
CONCENTRATIONS, DRY BASIS						
CO, %	7.6300	7.9500	2.2700	2.1900	1.1000	.8200
CO2, %	10.30	10.30	13.27	13.50	13.94	14.35
O2, %	.25	.13	.25	.01	.65	.00
HC, PPMC	2809	2296	1840	461	1609	334
NOX, PPM	520	265	1725	1050	1750	1025
AIR/FUEL RATIO	11.70	11.58	13.87	13.87	14.65	14.46
EMISSION RATES, G/HR						
CO	12791.5	13187.3	3424.7	3306.9	1472.2	1072.4
HC	236.5	191.3	139.4	34.9	108.2	21.9
NOX+	125.1	63.1	387.8	236.3	348.4	199.8
OIL TEMPERATURE, F	265	265	265	265	264	264
OIL PRESSURE, PSI	42	42	44	44	45	45
COOLANT TEMPERATURE, F	194	194	187	187	186	186
EXHAUST PRESSURE, IN. H2O	95.0	50.0	90.0	50.0	68.0	47.0
EXHAUST TEMPERATURE, F	1357	1282	1465	1382	1408	1344

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	66.1	66.2	67.1	67.2	68.1	68.2
TEST DATE	11/ 3/76	11/ 3/76	11/ 3/76	11/ 3/76	11/ 3/76	11/ 3/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	53	53	53	53	53	53
TEMPERATURE, F	97	97	96	96	97	97
ENGINE SPEED, RPM	5300	5300	5300	5300	5300	5300
TORQUE, FT-LB	29.7	29.7	19.8	19.8	12.3	12.3
POWER, BHP*	30.2	30.2	20.1	20.1	12.5	12.5
FUEL RATE, LB/HR	19.6	19.9	16.7	16.6	14.8	15.0
IGNITION TIMING, DEG BTDC	41.0	41.0	41.0	41.0	41.0	41.0
MANIFOLD VACUUM, IN HG	7.5	7.5	10.5	10.5	13.0	13.0
THROTTLE ANGLE, DEG	33.0	33.0	25.0	25.0	20.5	20.5
INTAKE MAN. TEMP., F	121	121	126	126	134	134
CONCENTRATIONS, DRY BASIS						
CO, %	1.1200	1.2000	.3650	.0120	1.9400	2.2900
CO2, %	13.90	14.21	14.08	14.60	13.53	13.40
O2, %	.50	.05	.75	.12	.63	.00
HC, PPMC	1839	225	1146	25	2531	864
NOX, PPM	2225	975	1700	1550	925	613
AIR/FUEL RATIO	14.54	14.34	15.09	14.94	14.17	13.77
EMISSION RATES, G/HR						
CO	1300.0	1394.6	376.3	12.1	1654.6	1935.0
HC	107.2	13.1	59.3	1.3	108.4	36.6
NOX+	384.8	168.9	261.2	232.9	117.6	77.2
OIL TEMPERATURE, F	262	262	258	258	256	256
OIL PRESSURE, PSI	45	45	45	45	45	45
COOLANT TEMPERATURE, F	185	185	185	185	185	185
EXHAUST PRESSURE, IN. H2O	56.0	38.0	40.0	27.0	26.0	18.0
EXHAUST TEMPERATURE, F	1361	1311	1336	1272	1257	1175

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	69.1	69.2	70.1	70.2	71.1	71.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	752.5	752.5
HUMIDITY, GRAINS/LB	44	44	44	44	45	45
TEMPERATURE, F	77	77	84	84	76	76
ENGINE SPEED, RPM	5300	5300	5300	5300	800	800
TORQUE, FT-LB	5.0	5.0	.8	.8	.6	.6
POWER, BHP*	5.0	5.0	.8	.8	.1	.1
FUEL RATE, LB/HR	13.9	14.7	13.8	13.9	1.3	1.3
IGNITION TIMING, DEG BTDC	43.0	43.0	42.5	42.5	8.5	8.5
MANIFOLD VACUUM, IN HG	16.5	16.5	17.0	17.0	17.0	17.0
THROTTLE ANGLE, DEG	18.0	18.0	17.0	17.0	.0	.0
INTAKE MAN. TEMP., F	122	122	131	131	141	141
CONCENTRATIONS, DRY BASIS						
CO, %	9.4900	8.0000	10.7500	10.2900	.1420	.0049
CO2, %	8.73	10.09	8.10	8.19	11.78	12.25
O2, %	.15	.01	.25	.05	4.00	3.65
HC, PPMC	4943	3438	10766	8496	5606	169
NOX, PPM	90	75	53	23	32	32
AIR/FUEL RATIO	10.72	11.39	10.04	10.16	17.22	17.71
EMISSION RATES, G/HR						
CO	5980.6	5589.3	6323.4	6181.6	13.6	.5
HC	156.5	120.6	318.0	256.3	27.0	.8
NOX+	8.1	7.5	4.5	2.0	.4	.5
OIL TEMPERATURE, F	234	234	247	247	187	187
OIL PRESSURE, PSI	46	46	45	45	17	17
COOLANT TEMPERATURE, F	186	186	185	185	192	192
EXHAUST PRESSURE, IN. H2O	15.0	8.0	13.0	8.0	1.0	.0
EXHAUST TEMPERATURE, F	1090	967	1072	982	482	525

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	72.1	72.2	73.1	73.2	74.1	74.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	752.5	752.5
HUMIDITY, GRAINS/LB	45	45	45	45	45	45
TEMPERATURE, F	76	76	77	77	77	77
ENGINE SPEED, RPM	800	800	800	800	700	700
TORQUE, FT-LB	10.0	10.0	20.0	20.0	7.6	7.6
POWER, BHP*	1.5	1.5	3.0	3.0	1.0	1.0
FUEL RATE, LB/HR	1.8	1.8	2.0	2.0	1.3	1.3
IGNITION TIMING, DEG BTDC	10.0	10.0	10.0	10.0	9.0	9.0
MANIFOLD VACUUM, IN HG	15.0	15.0	12.0	12.0	15.0	15.0
THROTTLE ANGLE, DEG	1.0	1.0	1.9	1.9	.0	.0
INTAKE MAN. TEMP., F	134	134	131	131	138	138
CONCENTRATIONS, DRY BASIS						
CO, %	.0916	.0024	.0748	.0024	.0916	.0024
CO2, %	12.75	13.00	12.62	12.88	12.25	12.50
O2, %	3.75	2.55	3.00	2.20	3.75	3.75
HC, PPMC	2770	255	4969	311	3095	226
NOX, PPM	170	100	580	410	93	78
AIR/FUEL RATIO	17.26	16.71	16.47	16.46	17.31	17.73
EMISSION RATES, G/HR						
CO	11.4	.3	9.9	.3	8.8	.2
HC	17.3	1.6	33.1	2.1	14.9	1.1
NOX+	3.0	1.8	11.1	8.1	1.3	1.1
OIL TEMPERATURE, F	184	184	184	184	182	182
OIL PRESSURE, PSI	19	19	17	17	16	16
COOLANT TEMPERATURE, F	192	192	187	187	191	191
EXHAUST PRESSURE, IN. H2O	1.0	.0	2.0	1.0	1.0	.0
EXHAUST TEMPERATURE, F	481	401	504	411	468	422

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	75.1	75.2	76.1	76.2	77.1	77.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	752.5	752.5
HUMIDITY, GRAINS/LB	45	45	45	45	45	45
TEMPERATURE, F	77	77	77	77	77	77
ENGINE SPEED, RPM	700	700	700	700	1000	1000
TORQUE, FT-LB	15.0	15.0	25.0	25.0	56.8	56.8
POWER, BHP*	2.0	2.0	3.3	3.3	10.6	10.6
FUEL RATE, LB/HR	1.8	1.7	2.1	2.2	6.9	6.7
IGNITION TIMING, DEG BTDC	9.0	9.0	9.0	9.0	10.0	10.0
MANIFOLD VACUUM, IN HG	13.0	13.0	11.0	11.0	.0	.0
THROTTLE ANGLE, DEG	1.0	1.0	2.0	2.0	75.0	75.0
INTAKE MAN. TEMP., F	134	134	124	124	86	86
CONCENTRATIONS, DRY BASIS						
CO, %	.0782	.0049	.0072	.0073	6.8300	7.3800
CO2, %	13.14	13.40	13.00	12.88	10.60	10.41
O2, %	2.75	2.50	2.75	2.50	.25	.00
HC, PPMC	3404	477	3285	849	5388	5275
NOX, PPM	390	290	1150	575	663	450
AIR/FUEL RATIO	16.41	16.59	16.51	16.62	11.80	11.49
EMISSION RATES, G/HR						
CO	9.7	.6	1.0	1.1	2305.7	2363.1
HC	21.1	2.8	24.0	6.5	91.3	84.8
NOX+	7.0	4.9	24.2	12.6	32.3	20.8
OIL TEMPERATURE, F	181	181	182	182	157	157
OIL PRESSURE, PSI	16	16	16	16	26	26
COOLANT TEMPERATURE, F	192	192	192	192	166	166
EXHAUST PRESSURE, IN. H2O	1.0	.0	1.0	.0	5.0	3.0
EXHAUST TEMPERATURE, F	464	414	502	408	784	617

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	78.1	78.2	79.1	79.2	81.1	81.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/16/76	11/16/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	750.0	750.0
HUMIDITY, GRAINS/LB	45	45	45	45	42	42
TEMPERATURE, F	76	76	77	77	88	88
ENGINE SPEED, RPM	1000	1000	1000	1000	1500	1500
TORQUE, FT-LB	42.6	42.6	27.7	27.7	59.0	59.0
POWER, BHP*	8.0	8.0	5.2	5.2	16.8	16.8
FUEL RATE, LB/HR	4.2	4.2	2.6	2.7	12.1	12.4
IGNITION TIMING, DEG BTDC	10.0	10.0	22.0	22.0	11.5	11.5
MANIFOLD VACUUM, IN HG	3.5	3.5	12.5	12.5	.0	.0
THROTTLE ANGLE, DEG	10.5	10.5	3.0	3.0	75.0	75.0
INTAKE MAN. TEMP., F	112	112	127	127	98	90
CONCENTRATIONS, DRY BASIS						
CO, %	.0770	.0049	.0724	.0049	11.4100	11.3600
CO2, %	12.75	12.88	13.00	13.40	8.19	8.20
O2, %	3.00	2.75	2.75	2.25	.25	.13
HC, PPMC	2657	51	3059	57	5114	4432
NOX, PPM	1725	1375	1625	1200	76	53
AIR/FUEL RATIO	16.79	16.95	16.51	16.49	10.23	10.22
EMISSION RATES, G/HR						
CO	22.1	1.4	12.8	.9	5966.2	6122.3
HC	38.3	.7	27.1	.5	134.3	120.0
NOX+	71.6	58.2	41.4	31.1	5.7	4.1
OIL TEMPERATURE, F	192	192	191	191	199	199
OIL PRESSURE, PSI	20	20	20	20	29	29
COOLANT TEMPERATURE, F	190	190	192	192	190	190
EXHAUST PRESSURE, IN. H2O	5.0	2.0	2.0	1.0	11.0	6.0
EXHAUST TEMPERATURE, F	808	784	622	624	928	846

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	82.1	82.2	83.1	83.2	84.1	84.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	752.5	752.5
HUMIDITY, GRAINS/LB	48	48	48	48	48	48
TEMPERATURE, F	76	76	74	74	74	74
ENGINE SPEED, RPM	1500	1500	1500	1500	1500	1500
TORQUE, FT-LB	44.0	44.0	23.5	23.5	5.8	5.8
POWER, BHP*	12.3	12.3	6.6	6.6	1.6	1.6
FUEL RATE, LB/HR	6.2	6.2	3.8	3.7	2.4	2.5
IGNITION TIMING, DEG BTDC	18.0	18.0	27.0	27.0	20.0	20.0
MANIFOLD VACUUM, IN HG	5.2	5.2	14.0	14.0	19.5	19.5
THROTTLE ANGLE, DEG	8.5	8.5	5.0	5.0	2.2	2.2
INTAKE MAN. TEMP., F	102	102	116	116	124	124
CONCENTRATIONS, DRY BASIS						
CO, %	.1060	.0049	.0988	.0024	.1511	.0024
CO2, %	13.27	13.53	12.88	13.27	13.40	13.67
O2, %	2.25	2.13	2.75	2.25	2.50	2.00
HC, PPMC	1647	57	2491	49	1650	74
NOX, PPM	1325	1225	1325	1475	195	155
AIR/FUEL RATIO	16.26	16.39	16.57	16.52	16.36	16.24
EMISSION RATES, G/HR						
CO	43.6	2.0	25.3	.6	24.7	.4
HC	34.0	1.2	32.0	.6	13.6	.6
NOX+	79.6	74.7	49.5	53.6	4.7	3.8
OIL TEMPERATURE, F	198	198	196	196	192	192
OIL PRESSURE, PSI	30	30	30	30	30	30
COOLANT TEMPERATURE, F	187	187	191	191	190	190
EXHAUST PRESSURE, IN. H2O	7.0	4.0	3.0	2.0	1.0	.0
EXHAUST TEMPERATURE, F	952	844	780	792	668	597

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	85.1	85.2	86.1	86.2	87.1	87.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	752.5	752.5
HUMIDITY, GRAINS/LB	48	48	48	48	48	48
TEMPERATURE, F	82	82	78	78	76	76
ENGINE SPEED, RPM	2000	2000	2000	2000	2000	2000
TORQUE, FT-LB	66.8	66.8	50.1	50.1	26.7	26.7
POWER, BHP*	25.1	25.1	18.8	18.8	10.0	10.0
FUEL RATE, LB/HR	14.8	14.9	9.0	9.0	5.7	5.9
IGNITION TIMING, DEG BTDC	17.0	17.0	18.0	18.0	32.0	32.0
MANIFOLD VACUUM, IN HG	.0	.0	4.0	4.0	9.5	9.5
THROTTLE ANGLE, DEG	75.0	75.0	20.0	20.0	9.5	9.5
INTAKE MAN. TEMP., F	81	81	94	94	146	146
CONCENTRATIONS, DRY BASIS						
CO, %	7.5300	7.7600	.1325	.0049	.1511	.0049
CO2, %	10.09	10.09	13.53	13.94	13.27	13.80
O2, %	.25	.00	1.75	1.50	2.38	1.88
HC, PPMC	3889	3549	1708	46	2386	68
NOX, PPM	250	150	1725	1625	363	400
AIR/FUEL RATIO	11.61	11.44	15.87	15.92	16.20	16.15
EMISSION RATES, G/HR						
CO	5388.3	5492.6	77.4	2.9	57.6	1.9
HC	139.8	126.2	50.1	1.3	45.7	1.3
NOX+	26.1	15.5	147.2	138.8	20.2	22.7
OIL TEMPERATURE, F	207	207	208	208	206	206
OIL PRESSURE, PSI	36	36	36	36	37	37
COOLANT TEMPERATURE, F	194	194	192	192	187	187
EXHAUST PRESSURE, IN. H2O	22.0	11.0	18.0	9.0	9.0	5.0
EXHAUST TEMPERATURE, F	1036	948	1084	974	950	937

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	88.1	88.2	89.1	89.2	90.1	90.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	752.5	752.5
HUMIDITY, GRAINS/LB	48	48	48	48	48	48
TEMPERATURE, F	76	76	82	82	77	77
ENGINE SPEED, RPM	2000	2000	2500	2500	2500	2500
TORQUE, FT-LB	6.7	6.7	70.0	70.0	52.5	52.5
POWER, BHP*	2.5	2.5	32.9	32.9	24.6	24.6
FUEL RATE, LB/HR	3.1	3.1	16.7	16.6	12.0	12.0
IGNITION TIMING, DEG BTDC	33.0	33.0	20.0	20.0	20.0	20.0
MANIFOLD VACUUM, IN HG	20.0	20.0	.0	.0	3.5	3.5
THROTTLE ANGLE, DEG	3.2	3.2	75.0	75.0	25.5	25.5
INTAKE MAN. TEMP., F	122	122	78	78	84	84
CONCENTRATIONS, DRY BASIS						
CO, %	.1700	.0049	5.1000	4.9500	.2116	.0049
CO2, %	13.14	13.27	11.80	12.02	13.40	13.80
O2, %	2.38	2.38	.25	.13	1.88	1.50
HC, PPMC	1419	51	2992	2506	1366	32
NOX, PPM	270	270	875	750	1775	1825
AIR/FUEL RATIO	16.32	16.57	12.65	12.68	15.97	15.94
EMISSION RATES, G/HR						
CO	35.2	1.0	4421.9	4293.6	166.3	3.8
HC	14.7	.5	130.3	109.2	53.9	1.3
NOX+	8.2	8.3	110.8	95.0	203.7	208.6
OIL TEMPERATURE, F	202	202	212	212	176	176
OIL PRESSURE, PSI	37	37	38	38	40	40
COOLANT TEMPERATURE, F	190	190	190	190	177	177
EXHAUST PRESSURE, IN. H2O	3.0	2.0	30.0	17.0	25.0	13.0
EXHAUST TEMPERATURE, F	787	786	1166	1042	1198	1008

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	91.1	91.2	92.1	92.2	93.1	93.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	752.5	752.5
HUMIDITY, GRAINS/LB	48	48	48	48	48	48
TEMPERATURE, F	76	76	76	76	82	82
ENGINE SPEED, RPM	2500	2500	2500	2500	3000	3000
TORQUE, FT-LB	28.0	28.0	7.0	7.0	69.8	69.8
POWER, BHP*	13.1	13.1	3.3	3.3	39.4	39.4
FUEL RATE, LB/HR	7.3	7.2	4.0	3.9	20.0	20.0
IGNITION TIMING, DEG BTDC	33.0	33.0	35.0	35.0	33.0	33.0
MANIFOLD VACUUM, IN HG	11.0	11.0	20.5	20.5	.5	.5
THROTTLE ANGLE, DEG	10.0	10.0	4.5	4.5	75.0	75.0
INTAKE MAN. TEMP., F	144	144	117	117	78	78
CONCENTRATIONS, DRY BASIS						
CO, %	.4740	.0940	.7475	.0240	5.1300	5.2600
CO2, %	14.08	14.95	14.08	14.78	11.66	11.90
O2, %	1.00	.50	.50	.75	.15	.00
HC, PPMC	2523	29	2470	69	2816	2132
NOX, PPM	500	320	480	420	790	600
AIR/FUEL RATIO	15.03	15.11	14.58	15.31	12.57	12.53
EMISSION RATES, G/HR						
CO	211.7	41.7	177.3	5.9	5312.8	5414.0
HC	56.6	.6	29.4	.8	146.5	110.2
NOX+	32.6	20.7	16.6	15.0	119.5	90.2
OIL TEMPERATURE, F	202	202	206	206	215	215
OIL PRESSURE, PSI	40	40	40	40	40	40
COOLANT TEMPERATURE, F	190	190	189	189	186	186
EXHAUST PRESSURE, IN. H2O	10.0	6.0	3.0	2.0	41.0	23.0
EXHAUST TEMPERATURE, F	996	982	845	842	1215	1060

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	94.1	94.2	95.1	95.2	96.1	96.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	752.5	752.5
HUMIDITY, GRAINS/LB	48	48	48	48	48	48
TEMPERATURE, F	82	82	84	84	76	76
ENGINE SPEED, RPM	3000	3000	3000	3000	3000	3000
TORQUE, FT-LB	52.3	52.3	27.9	27.9	6.9	6.9
POWER, BHP*	29.5	29.5	15.8	15.8	3.9	3.9
FUEL RATE, LB/HR	14.0	14.0	8.7	8.7	5.7	5.7
IGNITION TIMING, DEG BTDC	22.0	22.0	35.0	35.0	36.0	36.0
MANIFOLD VACUUM, IN HG	3.5	3.5	10.5	10.5	15.5	15.5
THROTTLE ANGLE, DEG	28.0	28.0	13.5	13.5	8.5	8.5
INTAKE MAN. TEMP., F	94	94	132	132	157	157
CONCENTRATIONS, DRY BASIS						
CO, %	.1682	.0049	.1603	.0024	.2950	.0049
CO2, %	13.67	13.94	13.53	13.80	12.50	13.14
O2, %	1.63	1.38	2.00	1.75	3.75	2.75
HC, PPMC	684	17	1139	285	3614	68
NOX, PPM	1475	1450	875	625	120	140
AIR/FUEL RATIO	15.86	15.83	16.07	16.04	17.06	16.86
EMISSION RATES, G/HR						
CO	153.1	4.4	91.6	1.4	118.5	1.9
HC	31.3	.8	32.7	8.2	72.9	1.4
NOX+	196.1	191.8	73.0	52.1	7.0	8.1
OIL TEMPERATURE, F	224	224	219	219	212	212
OIL PRESSURE, PSI	40	40	42	42	42	42
COOLANT TEMPERATURE, F	192	192	188	188	192	192
EXHAUST PRESSURE, IN. H2O	33.0	22.0	15.0	10.0	8.0	5.0
EXHAUST TEMPERATURE, F	1274	1150	1106	1067	1032	952

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	97.1	97.2	98.1	98.2	99.1	99.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76	11/ 4/76
BAROMETER, MMHG	752.5	752.5	752.5	752.5	752.5	752.5
HUMIDITY, GRAINS/LB	48	48	48	48	48	48
TEMPERATURE, F	81	81	81	81	80	80
ENGINE SPEED, RPM	3400	3400	3400	3400	3400	3400
TORQUE, FT-LB	69.8	69.8	53.2	53.2	27.9	27.9
POWER, BHP*	44.6	44.6	34.0	34.0	17.8	17.8
FUEL RATE, LB/HR	22.5	23.2	16.1	16.0	10.1	10.1
IGNITION TIMING, DEG BTDC	23.0	23.0	23.0	23.0	39.0	39.0
MANIFOLD VACUUM, IN HG	1.0	1.0	3.5	3.5	11.0	11.0
THROTTLE ANGLE, DEG	75.0	75.0	31.0	31.0	15.0	15.0
INTAKE MAN. TEMP., F	77	77	90	90	127	127
CONCENTRATIONS, DRY BASIS						
CO, %	6.1230	5.5700	.1627	.0049	.1627	.0024
CO2, %	11.22	11.78	13.67	13.94	13.67	13.94
O2, %	.13	.00	1.50	1.50	1.63	1.50
HC, PPMC	2357	1787	399	13	1369	31
NOX, PPM	675	575	1638	1625	775	775
AIR/FUEL RATIO	12.23	12.45	15.81	15.92	15.76	15.89
EMISSION RATES, G/HR						
CO	6962.2	6608.2	169.3	5.1	105.6	1.6
HC	134.6	106.5	20.9	.7	44.6	1.0
NOX+	112.1	99.6	248.9	246.2	73.4	74.3
OIL TEMPERATURE, F	232	232	230	230	226	226
OIL PRESSURE, PSI	42	42	44	44	44	44
COOLANT TEMPERATURE, F	188	188	187	187	192	192
EXHAUST PRESSURE, IN. H2O	53.0	33.0	41.0	28.0	17.0	13.0
EXHAUST TEMPERATURE, F	1264	1174	1332	1201	1161	1136

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	100.1	100.2	101.1	101.2	102.1	102.2
TEST DATE	11/ 4/76	11/ 4/76	11/ 5/76	11/ 5/76	11/ 5/76	11/ 5/76
BAROMETER, MMHG	752.5	752.5	748.8	748.8	748.8	748.8
HUMIDITY, GRAINS/LB	48	48	51	51	51	51
TEMPERATURE, F	78	78	85	85	86	86
ENGINE SPEED, RPM	3400	3400	4500	4500	4500	4500
TORQUE, FT-LB	6.9	6.9	65.4	65.4	48.0	48.0
POWER, BHP*	4.4	4.4	55.8	55.8	41.0	41.0
FUEL RATE, LB/HR	6.6	6.7	31.2	31.2	18.3	19.0
IGNITION TIMING, DEG BTDC	38.0	38.0	30.0	30.0	27.0	27.0
MANIFOLD VACUUM, IN HG	16.0	16.0	1.0	1.0	4.9	4.9
THROTTLE ANGLE, DEG	9.5	9.5	75.0	75.0	40.0	40.0
INTAKE MAN. TEMP., F	154	154	87	87	111	111
CONCENTRATIONS, DRY BASIS						
CO, %	.2635	.0024	7.2400	7.2300	.3650	.0049
CO2, %	13.27	13.80	10.50	10.29	13.93	14.21
O2, %	1.50	2.25	.10	.03	.80	.75
HC, PPMC	1421	46	1491	916	1145	20
NOX, PPM	170	180	690	350	1725	1675
AIR/FUEL RATIO	15.61	16.41	11.85	11.80	15.13	15.38
EMISSION RATES, G/HR						
CO	111.8	1.1	11086.2	11053.3	413.1	5.8
HC	30.3	1.0	114.7	70.3	65.1	1.2
NOX+	10.5	11.7	156.3	79.2	288.9	295.2
OIL TEMPERATURE, F	220	220	249	249	236	236
OIL PRESSURE, PSI	44	44	42	42	43	43
COOLANT TEMPERATURE, F	192	192	196	196	194	194
EXHAUST PRESSURE, IN. H2O	8.0	6.0	81.0	50.0	48.0	29.0
EXHAUST TEMPERATURE, F	1102	1001	1332	1252	1366	1236

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	103.1	103.2	104.1	104.2	105.1	105.2
TEST DATE	11/ 5/76	11/ 5/76	11/ 5/76	11/ 5/76	11/12/76	11/12/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	752.0	752.0
HUMIDITY, GRAINS/LB	51	51	51	51	44	40
TEMPERATURE, F	78	78	81	81	87	87
ENGINE SPEED, RPM	4500	4500	4500	4500	5300	5300
TORQUE, FT-LB	26.0	26.0	6.0	6.0	54.9	54.9
POWER, BHP*	22.0	22.0	5.1	5.1	54.9	54.9
FUEL RATE, LB/HR	13.2	13.1	8.6	8.5	35.5	35.1
IGNITION TIMING, DEG BTDC	41.0	41.0	37.0	37.0	27.0	27.0
MANIFOLD VACUUM, IN HG	11.0	11.0	17.0	17.0	1.5	1.5
THROTTLE ANGLE, DEG	28.0	28.0	16.0	16.0	75.0	75.0
INTAKE MAN. TEMP., F	117	117	146	146	87	87
CONCENTRATIONS, DRY BASIS						
CO, %	.2011	.0024	1.5700	1.9300	7.6000	7.4300
CO2, %	13.53	13.80	13.80	13.80	10.09	10.30
O2, %	1.40	1.20	.35	.35	.23	.13
HC, PPMC	1025	29	1727	750	3175	2234
NOX, PPM	1200	1200	200	112	480	225
AIR/FUEL RATIO	15.64	15.70	14.20	14.14	11.63	11.72
EMISSION RATES, G/HR						
CO	169.5	2.0	782.7	949.3	13054.2	12690.9
HC	43.4	1.2	43.2	18.5	273.9	191.7
NOX+	149.7	149.8	14.8	8.2	118.3	54.2
OIL TEMPERATURE, F	206	206	231	231	268	268
OIL PRESSURE, PSI	47	47	45	45	43	43
COOLANT TEMPERATURE, F	196	196	196	196	198	198
EXHAUST PRESSURE, IN. H2O	20.0	11.0	10.0	5.0	99.0	74.0
EXHAUST TEMPERATURE, F	1213	922	1147	988	1354	1296

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: CHEVROLET 1.4 LITER 4 CYLINDER
FUEL CODE: 7619

TEST NUMBER	106.1	106.2	107.1	107.2	126.1	126.2
TEST DATE	11/ 5/76	11/ 5/76	11/ 5/76	11/ 5/76	11/12/76	11/12/76
BAROMETER, MMHG	748.8	748.8	748.8	748.8	752.0	752.0
HUMIDITY, GRAINS/LB	51	51	51	51	44	44
TEMPERATURE, F	87	87	86	86	86	86
ENGINE SPEED, RPM	5300	5300	5300	5300	5500	5500
TORQUE, FT-LB	42.6	42.6	22.7	22.7	53.7	53.7
POWER, BHP*	42.9	42.9	22.8	22.8	55.7	55.7
FUEL RATE, LB/HR	24.3	24.0	15.6	15.8	35.1	35.4
IGNITION TIMING, DEG BTDC	28.0	28.0	12.5	12.5	28.0	28.0
MANIFOLD VACUUM, IN HG	4.5	4.5	12.0	12.0	2.5	2.5
THROTTLE ANGLE, DEG	53.0	53.0	40.0	40.0	75.0	75.0
INTAKE MAN. TEMP., F	97	97	121	121	81	81
CONCENTRATIONS, DRY BASIS						
CO, %	1.6500	1.7400	1.8800	2.0300	7.3700	7.3800
CO2, %	13.53	13.53	13.26	13.40	10.40	10.40
O2, %	.30	.05	.35	.05	.18	.10
HC, PPMC	1781	425	2410	782	2695	1806
NOX, PPM	1450	1050	1125	790	540	215
AIR/FUEL RATIO	14.16	14.07	14.02	13.91	11.76	11.76
EMISSION RATES, G/HR						
CO	2325.3	2406.6	1687.7	1824.4	12608.6	12766.4
HC	126.0	29.5	108.6	35.3	231.5	156.9
NOX+	302.4	214.9	149.4	105.1	132.6	53.4
OIL TEMPERATURE, F	192	192	237	237	251	251
OIL PRESSURE, PSI	50	50	45	45	43	43
COOLANT TEMPERATURE, F	166	166	197	197	194	194
EXHAUST PRESSURE, IN. H2O	69.0	37.0	28.0	15.0	99.0	50.0
EXHAUST TEMPERATURE, F	1412	1207	1241	1097	1380	1300

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

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